product of the principal radii of curvature of the surface at any point remains constant) that a diminished curvature along the axis will be accompanied by a nearer approach to a circular section, and reciprocally. Since a circular form has the largest area for a given perimeter, internal pressure tends to diminish the eccentricity of the elliptic section, and with it the general curvature of the tube. Thus, if one end be fixed, a pointer connected with the free end may be made to indicate the internal pressure." Lord Rayleigh adds, "It appears, however, that the bending of a curved tube of elliptical action cannot be pure (*i.e.* unaccompanied by stretching), since the parts of the walls which lie furthest from the circular axis are necessarily stretched. The difficulty thus arising may be obviated by replacing the two halves of the ellipse, which lie on either side of the major axis, by two symmetrical curves which meet on the major axis at a *finite angle*."

In fact some Bourdon gauges, notably those required for low pressures only, and requiring great sensibility but not much strength, are constructed in this manner, and the difficulty of manufacture is thereby considerably reduced. Barometers are constructed in this way, and give good results; the tube is partially exhausted of air, and closed at both ends; and now an increase of external atmospheric pressure tends to flatten, and thus curl up the tube.

In constructing any theory, we are then immediately brought up by the great difficulty at present engaging the attention of our mathematical elasticians, such as Rayleigh, Basset, Pearson, and Love; who are not agreed as to how far it is legitimate to theorize on the equilibrium of elastic shells, by treating separately the bending and the stretching as independent of each other, and considering the first—the bending—of the most importance.

If we take a piece of thin sheet metal in our hands, we find we can bend it with comparative ease, but any stretching we can produce is quite insensible; and it is thence argued that bending only is likely to take place, as so easily produced; and apparently reversing the ordinary mathematical procedure, the large stresses due to any stretching are neglected, as not likely to be in existence. These difficulties confront us in any attempt at a rigorous theory of the instrument, which would give quantitative results, enabling us to graduate the instrument from a formula.

The Rev. E. Hill has given in the *Messenger of Mathematics*, vol. i., 1872, an explanation of the Bourdon metallic barometer, treating the question as one of pure bending, and giving a quantitative formula for the change of curvature a of the total curvature θ in terms of the change x in the semi-minor axis b, viz. $a/\theta = x/b$. But the determination of x/b for a given change of pressure is as yet an intractable mathematical problem, even for the simplification of supposing the tube a straight elliptic cylinder.

When we attempt to determine mathematically the pure bending produced in an elliptic cylinder by an increase of internal pressure and consequent tendency of the cross-section to the circular form, we are baffled by the analytical difficulties of determining the change in the length of the axes of the section, subject to the condition of keeping the perimeter unchanged in length, this length being expressed by a complete elliptic integral of the second kind, of which the modulus is the eccentricity of the ellipse. This problem was mentioned by Sir W. Thomson at the British Association in 1888; but we have not yet seen any development of it published by him.

Mr. Worthington, on the other hand, treats the question from the point of view of pure stretching; and now, with rectangular cross-section of the tube, as he supposes, a thrust in the inner wall due to the internal pressure will cause this wall to contract, while the pull in the outer wall will cause this wall to elongate; and thus an increase of internal pressure would cause the tube to curl up, the opposite effect to what happens when the bending effect due to the outward bulging of the flat walls is considered the leading phenomenon.

Even with a circular cross-section the stretching hypothesis would prove that the tube curls up under internal pressure; but this effect would be so small as to be imperceptible, because of the enormously greater stresses required for stretching than for bending in a thin tube; and this is found to be practically the case, inasmuch as the circular cross-section of the tube destroys all indications; and further, that the indications of the tube are reversed in direction when the axes of the elliptical cross-section are interchanged so that the minor axis is perpendicular to the plane of the circular axis of the tube.

The action of Bourdon's gauge is a differential effect; the bending of the surface changes the curvature one way, and the stretching produced by the same pressure the other way; but the bending effect is so much greater than that of stretching, that the latter may be left out of account.

In Gunnery we have, in a similar manner, two antagonistic causes producing a tendency for an elongated rifled projectile to deviate from a vertical plane of motion. If fired from a gun rifled with a right-handed screw, the vortex set up in the air by the spinning of the projectile causes differences of pressure, tending to deviate the projectile to the left, and this effect is sometimes very noticeable with golf or tennis balls; but, in addition, the forces set up by the tendency of the projectile to fly with its axis in the tangent of the trajectory urge the projectile to the right, and these latter forces are found to preponderate in practice.

A mathematician might be tempted to apply to the problem of Bourdon's gauge the formulas on the equilibrium of elastic plates and their change of curvature, anticlastic and synclastic, which are given in Thomson and Tait's "Natural Philosophy" (§§ 711–720), but these formulas apply only to a plate originally plane; and, besides, the applied pressures of the liquid complicate the analysis of the question to an extent which has not yet been overcome by elasticians.

The final conclusion would thus appear to be, that any quantitative formula cannot be hoped for yet, for a long time; but that Lord Rayleigh's reasoning, quoted above, gives a clear and concise descriptive explanation of the action.

The analogous practical problem of the resistance of flues to collapse still stands in need of a rational theory, when the supporting influence of the ends or of collapse rings is taken into account. When this question has received satisfactory treatment at the hands of theorists, we may hope to pass on to the far more difficult quantitative theory of Bourdon's gauge.

A. G. GREENHILL.

NOTES.

THE half-yearly general meeting of the Scottish Meteorological Society was held in the hall of the Royal Scottish Society of Arts, Edinburgh, on Monday afternoon. The following papers were read:—Influenza and weather, with special reference to the recent epidemic, by Sir Arthur Mitchell and Dr. Buchan; the temperature of the high and low-level Observatories of Ben Nevis, by T. Omond, Superintendent; thunderstorms at the Ben Nevis Observatory, by R. C. Mossmann. In the last Report presented by the Council, reference was made to a proposed systematic observation of the numbers of dust-particles in the atmosphere with the instrument recently invented by Mr. John Aitken, and an opinion was expressed that, for many reasons, Ben Nevis Observatory was the place where such observations could be most satisfactorily conducted. From the Report presented on Monday, we learn that a grant of £50 has been obtained from the Government Research Fund for commencing this novel and important investigation. Two instruments, constructed by Mr. White, of Glasgow, under the direction of Mr. Aitken, have been obtained —one to be placed permanently within the Observatory itself, and the other, a portable instrument, for outdoor observation. Both instruments are now at the Observatory, and the regular work of observation has begun. The Report also states that the delay in completing the buildings of the low-level Observatory at Fort William turned out to be more serious than was contemplated. This has arisen from various causes, chiefly from the great drought in the West Highlands last summer rendering it necessary that the ships conveying the stones for the building from Elgin be sent round the north and west coast instead of through the Caledonian Canal, which for the time was closed for through traffic; and also from the wet, broken weather of the past winter. In about three weeks the Observatory will be completed, and immediately thereafter the Meteorological Council will erect the self-registering instruments which were originally at Armagh, and otherwise supply a complete outfit of instruments for a first-class Meteorological Observatory. An additional observer has been engaged, and the staff of the two Observatories now consists of Mr. Omond, superintendent, and three assistants. By arrangement with the Post Office, direct communication will be opened between the two Observatories. The regular work of recording the continuous observations will be begun in May. The Directors of the Ben Nevis Observatory will thus soon be in a position to put scientific men in possession of two sets of hourly observations of the completest description, one at the top and the other at the foot of the mountain. With these observations, the changes of the conditions of the weather may be followed hour by hour; particularly those great changes, so vital and essential to the advancement of our knowledge of storms, which take place in the lowermost stratum of the atmosphere between the two Observatories. It is within this aërial stratum, of a vertical height of 4406 feet, that the gradual development of many weather changes from hour to hour may be satisfactorily investigated.

THE Chemical Society held its first anniversary dinner at the Hôtel Métropole on Thursday evening last. Among those present were the Presidents of the Royal Society, the Institute of Civil Engineers, the Society of Chemical Industry, the Institute of Chemistry, the Pharmaceutical and the Physical Societies, Sir F. Abel, Sir Henry Roscoe, Sir F. Bramwell, Mr. Thiselton-Dyer, Prof. J. Dewar, Dr. J. H. Gladstone, and Mr. W. Crookes. Dr. W. J. Russell, the President, in proposing posperity to the Chemical Society, sketched briefly the history of its rise and development. Sir Frederick Abel gave the toast of "Kindred Societies and Institutions," referring to the far-reaching character of the science of chemistry. There was not, he said, a single society or institution which was not dependent upon chemists for, at any rate, some amount of the usefulness which it exercised. The Royal Society was the great parent of them all; and the Royal Institution demanded special homage on account of the splendid discoveries made under its auspices, so many of which were specially interesting to chemists. Sir G. Stokes, in response, said that though specialism had been gaining ground very widely of late years, and though each branch of science had its own particular exponents enrolled in their own association, yet the old society, with which he had the honour to be closely connected, was not altogether effete. He thought that chemistry had as much need of cognate societies as any other branch of scientific research. Sir Lowthian Bell also replied. Prof. M. Foster, secretary to the Royal Society, proposed "The Visitors," and the toast was responded to by Sir F. Bramwell and by Mr. Thiselton-Dyer. The health of the chairman was proposed by Sir H. Roscoe.

ON Friday evening last the learned societies of Newcastle held their second annual gathering at the Durham College of Science. Among the societies represented were the following: the Durham College of Science, Engineering Students' Club, Foremen Engineers and Draughtsmen, Geographical Society, Institute of Mining and Mechanical Engineers, Literary and Philosophical Society, Medical Society, Microscopical Society, Natural History Society, N.E.C. Institution of Engineers and Shipbuilders, Pharmaceutical Association, Photographic Association, Society of Antiquaries, and Society of Chemical Industry. The *Newcastle Daily Journal* says that the professors of the Durham College of Science "worked hard for the success of the gathering," and that "the exhibits which they explained in the chemical, physical, geographical, botanical, and other departments in the building, afforded a vast amount of pleasure."

BY permission of the trustees of the British Museum, the *conversazione* of the Society of Arts will be held this year at the Natural History Museum, South Kensington.

MR. WRAGGE, Government Meteorologist, Queensland, has been dangerously ill with fever caught some time since in his tours of inspection. He has now gone to the Darling Downs to recruit his heath, which has been seriously undermined.

THE following lectures on scientific subjects will probably be delivered at the Friday evening meetings at the Royal Institution after Easter:—Friday, April 18, Sir Frederick Bramwell, F.R.S., welding by electricity; Friday, April 25, Sir John Lubbock, Bart., M.P., F.R.S., the shapes of leaves and cotyledons; Friday, May 9, Mr. R. Brudenell Carter, colour-vision and colour-blindness; Friday, May 16, Prof. Raphael Meldola, F.R.S., the photographic image; Friday, May 23, Prof. A. C. Haddon, manners and customs of the Torres Straits islanders; Friday, May 30, A. A. Common, F.R.S., astronomical telescopes; Friday, June 6, Prof. W. Boyd Dawkins, F.R.S., the search for coal in the South of England.

AT the twenty-first annual meeting of the Norfolk and Norwich Naturalists' Society, held at the Norwich Museum on March 25, Mr. Henry Seebohm was elected president for the ensuing year. The treasurer's report showed that the financial condition of the Society was very satisfactory, and that during the past year there had been an increase of several members. The retiring president, Dr. Taylor, after briefly reviewing the work of the Society during the past year, delivered an address on "Microbes."

THE London Geological Field Class, under the direction of Prof. H. G. Seeley, F.R.S., has made arrangements for a number of excursions, in which many students might find it pleasant and profitable to take part. One set of excursions is specially arranged for the practical study of geography. Others are planned for the illustration of the geological structure of the London district.

A VIOLENT earthquake shock was felt at Trieste on March 26 at 20 minutes past 9 p.m.

AT the last meeting of the Scientific Committee of the Royal Horticultural Society, Mr. Morris alluded to the peculiar vegetation of St. Helena, now confined, for the most part, to a small area in the central and higher part of the island. Many of the trees formerly native to the island are now all but, or quite, extinct. Among them is a species of Trochetia, or Melhania. The trunks of this tree are embedded in the cliffs of the island, and are dug out by the inhabitants for the sake of manufacturing ornaments. The following quotation from Melliss's exhaustive work on St. Helena refers to this plant:—"The Native Ebony of St. Helena.—This plant I believe to be now extinct. It formerly grew on the outer portions of the island, near the coast, at altitudes of 2 to 4, where the weather-beaten stems are still found deeply embedded in the surface-soil. The last plant I saw was a small one growing in the garden at Oakbank, about twenty-five years ago, but it is not there now, and I have searched the whole island over for another, but in vain. The leaves were dark green, and the flowers white; the wood is very hard, heavy, black in colour, and extremely brittle. It is still collected and turned into ornaments, which are much prized on account of its rarity. That this tree once formed a considerable portion of the vegetation clothing the island on those parts that are now quite barren, is strongly evidenced by the many references to it in the local records. Pl. 29. It is the *Dombeya erythroxylon* of Andr., *Bot. Repos.*, vi., t. 389, not of Willdenow." It is interesting to know that the plant is still in existence under cultivation at Kew (and perhaps elsewhere), under the name of *Dombeya erythroxylon*. At the present time the plant, which was obtained from the gardens at Herrhausen, is in flower at Kew. Mr. McLachlan called attention to the interesting remark on the rare plants of St. Helena, contained in Mr. Wollaston's book on the Coleoptera of the Atlantic islands.

CAPT. DELPORTE, Professor of Topography, Astronomy, and Geodesy, at the Military School of Brussels, has just started for the River Congo, for the purpose of making geodetic researches.

THE Geographical Society of Berlin has presented the sum of 1000 marks (£50), to Dr. Hettner for a journey of research in the southern provinces of Brazil.

SOME prehistoric German tombs were recently excavated on the road leading from Apolda to Jena. About 20 skeletons were found (two being without skulls), and a number of ornaments and weapons.

IN the course of some excavations lately made at Ludwigshafen, on the Rhine, the tibia and two teeth of a mammoth, and the jaw of a stag, were found. The skeleton of another "antediluvian" animal was discovered in the limestone near Oberhildesheim. The researches are being continued.

THE *Zoologist* for 1884 announced a proposed supplement to Thompson's "Natural History of Ireland," and contributions of information were invited from persons interested in the subject. A considerable amount of fresh material has been accumulated, but as it relates chiefly to birds, it is now intended that the supplement shall deal only with ornithology. The new work will be published by Messrs. Gurney and Jackson, and an appeal for additional facts has been issued to students who may be able and willing to supply notes. Anyone who is in a position to respond to this appeal is requested to communicate with Mr. R. J. Usher, Cappah, Lismore, Ireland.

MR. ELLIOT STOCK has issued the seventh edition of "Days and Hours in a Garden," by E. V. B. The volume is prettily printed and bound, and lovers of the country will find much to interest them in the writer's bright and pleasant descriptions.

THE Royal University of Ireland has issued its Calendar for the year 1890, and a supplement consisting of the examination papers of 1889.

THE first edition of the life of the Rev. J. G. Wood, by his son, the Rev. Theodore Wood, has been already exhausted; and a second edition is about to be issued.

A FACT noted by Mr. T. H. Hall in the new number of the *Entomologist's Monthly Magazine* indicates the extraordinary variety of conditions in which beetles may thrive. The men employed in breaking up an old disused gasometer at Home Park Mills, King's Langley, spoke to him of some "very curious beetles," which were living in the rusty water at the bottom of the hole left when the iron casing had been removed. Both the water and mud were strongly impregnated with gas. The beetles proved to be of the *D. marginalis* species, and were there in some numbers. Many were carried away when the water was pumped off, but Mr. Hall secured specimens from the mud and shallow water left. He says:—"They carry with them a strong odour of gas, even after two or three fresh-water baths, and the grooves in the elytra of the females are filled with a ferruginous mud which is difficult to remove. In other respects they appear to be quite normal in form and colour. I think this old gas-holder must have been their home for a long period of beetle life, judging from the time of year when they were found, a fortnight ago, and from the number of *both* sexes seen. The water was partly enclosed and quite stagnant, being unconnected with any other water. Were they there by choice? If not, why did they not emigrate? Most likely they came there by chance, as they are plentiful in the canal not far away, and lacking the inclination to depart, 'made themselves at home.' Had the water been disagreeable to them, we may presume they would not have done so; they were quite active when disturbed."

ACCORDING to a French journal, the number of foreign students now studying in Paris is about 1000, of whom 729 (107 of them women) are studying medicine, and 182 law. Literature has 66 (including 9 women), science 60, and pharmacy 23. It is remarkable that Russia furnishes the largest contingent of the foreign medical students, viz. 150, America coming next with 139. We find no mention of England. The foreign element is, on the above estimate, about one-tenth of the whole.

THE Punjab Forest Administration Report for 1888–89 was recently published. During the year, nine thousand acres were added to the area of gazetted forests in the Multan district. This area was taken up in pursuance of the policy of establishing irrigated plantations in connection with several new canals constructed in what are known as the "Bar" tracts—that is, the dry upland deserts of the Punjab. The number of forest fires increased during the year, and 17,617 acres were burnt as against 10,324 during 1888. The financial results are satisfactory. The net revenue amounted to Rs. 4,52,846, or nearly half a lakh in excess of the net revenue of the preceding year. The Conservator complains that the Working Plans Branch cannot get on with their work on account of the undermanning of the Department. As a consequence, working plans are only in force over 364 square miles, out of a total of two thousand square miles gazetted and six thousand controlled by the Forest Department. Experiments with exotics were made, but the result was not encouraging. European fruit-trees have been introduced in many places with great success.

THE first Report published by the Marine Fisheries Society of Great Grimsby is a modest record of work done and investigations decided on by an institution which, by employing scientific methods, will probably amass information of great value to the biologist, and improve our fisheries in their commercial aspects. The Society was incorporated in June 1888. It has already established an aquarium and hatchery which is 37 feet by 21 feet, and a small museum and library. The building has a frontage of 50 feet, and is situated at Cleethorpes, facing the Promenade, two miles distant from Grimsby. The tanks are set on concrete walls; they were purchased from the National Fish-Culture Association, and originally formed the aquarium at the Fisheries Exhibition at South Kensington. They form a reservoir storing 4000 gallons of sea-water, from which the water is pumped into a wooden tank 10 feet above the hatchery, holding 1200 gallons. Thus a constant circulation of the water in the tanks is maintained. The water is pumped from the sea at high water, and left to settle some days in a storage reservoir before use; each hatching tank has room for twelve wooden trays, measuring 16 inches by 10 inches, by 9 inches in depth, with a canvas strainer at the bottom to prevent the eggs escaping. The Society aims at recording observations respecting marine life, and the improvement of the fisheries of the United Kingdom, by the artificial propagation of marine fishes and Crustacea, by the pursuit of scientific observations and investigations respecting the natural history, habitat, migration, spawning food, and the effect of weather, temperature, and conditions of the water, currents, tides, light, and darkness upon the fauna of the sea; by the protection of young fish, and the introduction of practical appliances for the capture of mature fish; by endeavouring to ascertain the best methods of transporting fish in a fresh condition, and economically preserving them. By admitting fishermen into the Society, at a nominal subscription, they hope to get numerous observers and collectors from amongst those who spend their life reaping the harvest of the sea.

AT the last meeting of the Société Chimique de Paris a paper by M. Meslans was presented by M. Moissan, announcing the isolation of fluoroform, CHF_3, the fluorine analogue of chloroform, $CHCl_3$. A brief abstract of this preliminary communication will be found in the *Chemiker Zeitung* for March 26. During the course of the work recently published concerning propyl and isopropyl fluorides, M. Meslans had occasion to study the action of silver fluoride upon iodoform. The result of this action was found to vary according to the conditions of experiment, liquid products being obtained under certain conditions, and gaseous products under others. The end result, however, was always the production of a gas, which turns out to be fluoroform. Chloroform, as is well known, is readily attacked by a warm alcoholic solution of potash, potassium chloride and potassium formate being produced: $CHCl_3 + 4KOH = H.COOK + 3KCl + 2H_2O$. It is interesting to learn that fluoroform behaves in precisely the same manner, for the gas is decomposed by either aqueous or alcoholic potash with formation of fluoride and formate of potassium. On being heated to redness in a glass tube fluoroform is also decomposed, with production of gaseous silicon tetrafluoride and a deposit of carbon. The gas is only very slightly absorbed by water, but it dissolves readily in chloroform or alcohol. Fluoroform has also been prepared by substituting chloroform or bromoform for the iodoform used in the first experiments.

AT the same meeting M. Chabrié reported that he also had obtained a gas by heating silver fluoride with chloroform in a sealed tube, which yielded potassium formate with potash, and was evidently identical with the fluoroform described by M. Meslans. The density of the gas was determined, and found to be 2·414. Fluoroform possesses the density 2·43, so there can be no doubt as to the identity of the gas. Although so readily attacked by warm potash, it was found that a cold alcoholic solution of potash was almost incapable of acting upon it.

M. MOISSAN also presented another interesting paper in the names of MM. Guenez and Meslans, describing the isolation of fluoral, $CF_3.CHO$, the analogue of chloral, $CCl_3.CHO$, the tri-chlor derivative of common aldehyde, $CH_3.CHO$, and the hydrate of which has recently become so famous as a drug. Fluoral, like fluoroform, is a gas, and has been obtained by heating silver fluoride with anhydrous chloral. The gas dissolves to only a very slight extent in water, but is absorbed by aqueous or alcoholic potash with formation of formate and fluoride of potassium, thus again resembling its chlorine analogue. To complete the proof of its identity, the density of the gas was determined and found to agree very closely with the calculated density of anhydrous fluoral.

THE additions to the Zoological Society's Gardens during the past week include two Ring-necked Pheasants (*Phasianus torquatus* ♂ ♀), British, presented by H. R. H. the Prince of Wales, K.G.; a Chacma Baboon (*Cynocephalus porcarius* ♀) from South Africa, two Indian Pythons (*Python molurus*) from India, five Common Boas (*Boa constrictor*) from South America deposited; three Red-footed Ground Squirrels (*Xerus erythropus*) from West Africa, two Himalayan Monauls (*Lophophorus impeyanus* ♀ ♀) from the Himalayas, two Diuca Finches (*Diuca grisea*), a Black-chinned Siskin (*Chrysomitris barbata*) two Field Saffron Finches (*Sycalis arvensis*), an Alaudine Finch (*Phrygilus alaudinus*) from Chili, purchased; a Hog Deer (*Cervus porcinus* ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on April 3 = 10h. 48m. 43s.

Name.	Mag.	Colour.	R A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 2343	—	Greenish.	11 8 10	+55 36
(2) 44 Leonis	6	Yellowish-red	10 19 27	+ 9 20
(3) 58 Leonis	4·5	Whitish-yellow.	10 54 54	+ 4 13
(4) θ Leonis...	3	White.	11 8 30	+16 2
(5) 145 Schj.	8	Red.	12 19 36	+ 1 23
(6) S Coronæ	Var.	Reddish-yellow.	15 16 55	+31 46

Remarks.

(1) This is the well-known nebula 97 M, near β Ursæ Majoris. In the General Catalogue it is described as "a planetary nebula, very bright, very large, round; at first very gradually, then very suddenly brighter in the middle to a planetary disk; 19·0s. in diameter." Lord Rosse's drawing of the nebula indicates a very complex structure. I examined the nebula recently with Prof. Lockyer's 30-inch reflector at Westgate-on-Sea, but was unable to see all the details shown in Lord Rosse's drawing. The nebula appeared to be a large disk, ill-defined at the edges, and equally illuminated, with the exception of two darker disks situated diametrically opposite to each other, each being about half a radius in diameter. Dr. Huggins observed the spectrum in 1866, and found it to consist of bright lines. The two lines near λλ 500 and 495, and possibly a little continuous spectrum were recorded. On the occasion above referred to I saw the three usual nebula lines and the hydrogen line at G, but was unable to continue the observations on account of clouds. In further observations, additional lines ought to be looked for, and the character of the chief line near λ 500 particularly noted, as in the case of the nebula G.C. 2102, given last week.

(2) A star of Group II. Dunér states that the bands 2-8 are well seen, but that they are not strongly marked. It is important to secure further observations of stars like this, as there may very well be other differences besides the weakening of the bands as compared with those in which the banded spectrum is more fully developed.

(3) This has a fine spectrum of the solar type (Vogel). The usual differential observations are required.

(4) The spectrum of this star is a typical one of Group IV. (Vogel). The hydrogen lines are probably therefore very thick, and the metallic lines very thin, if visible at all. The thicker the hydrogen line the hotter the star, and the higher therefore its place on the "temperature curve."

(5) Vogel and Dunér agree in describing the spectrum of this star as a very fine one of Group VI. The three carbon bands are stated to be visible, but the intensity of the band near λ 564 relatively to the others is not given. This point should therefore receive attention. The secondary bands 4 and 5, and possibly 2 and 3 are visible. It is interesting to note that this star shows considerably more detail than several brighter ones of the same group.